Wifi2UART Module
User Manual

Version	Issue date	Changes	Remark
0.1	2015/6/05	Initial Version	

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1. Introduction

The Wifi2UART module is an embedded UART to WiFi/Ethernet (serial port to Wireless/Wired network) conversion module. This product is based on the universal serial interface standard, built-in TCP/IP protocol stack, enabling UART to WiFi/Ethernet conversions between the user serial port and wireless network (WiFi) and Ethernet interfaces.

Through the Wifi2UART module, the traditional serial devices do not need to change their configurations. Data from the UART port can be transmitted through the wireless and wired IP network, and vice versa. It provides a solution for the users' serial devices to transfer serial port data via the IP network (or the Internet).

Figure 1-1 shows the functional diagram of the Wifi2UART module, which provides end-to-end UART connections from Wifi2UART module to remote Server or Client. (When Wifi2UART is a server, remote clients will connect to it; when Wifi2UART is a client, it connects to a remote server).

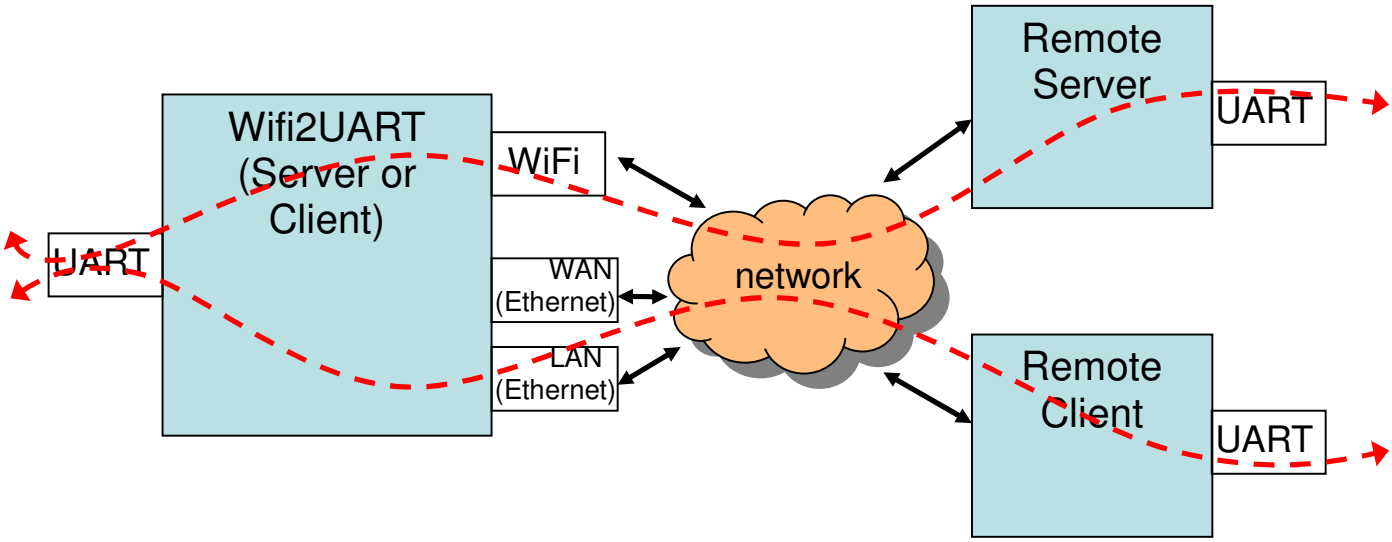

Figure 1-1 Functional Diagram of Wifi2UART Module

2. Technical specification

Items	Specification
Network standard	WiFi: IEEE 802.11n, 802.11g, 802.11b Ethernet: IEEE 802.3, 802.3u
WiFi transmission rate	11n: up to 150 Mbps 11g: up to 54 Mbps 11b: uo to 11 Mbps
WiFi Channel number	1 ~ 14
WiFi Frequency	2.4 ~ 2.4835 GHz

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Interface	2 Ethernet ports, 1 serial port for data, 1 serial port for console, an embedded WiFi interface
Serial baud rate	1200 ~ 230400 bps
Service mode	Server, Client, Not-In-Service
Network protocol	TCP/IP, UDP/IP
TCP Server connection	Up to 10 TCP clients can connect to Wifi2UART concurrently
Management	AT-command via serial port, web management, web software upgrade
Network mode	There are four Network modes available: 1. (WiFi) AP Router Mode (WiFi AP and 2 Ethernet ports for WAN and LAN) (default mode). 2. Single Ethernet WAN Mode. 3. (WiFi) AP Client Mode. 4. (WiFi) AP Mode.
Status indicator	1 status indicator

3. Quick Start

The Wifi2UART UART port uses 115200-8-N-1 (baud rate 115200 bps, 8 data bits, no parity check, 1 stop bit) as its default setting. Please connect your PC or serial device (with a terminal with the same 115200-8-N-1 setting) to the Wifi2UART UART port.

The Wifi2UART has two ***Operation Modes***: AT Command Mode and Transparent Transmission Mode. In AT Command Mode, Wifi2UART will treat incoming data from the UART port as AT commands; while in Transparent Transmission Mode, Wifi2UART can send data from the UART port to WiFi or Ethernet ports and vice versa. After power on, Wifi2UART is in Transparent Transmission Mode. Before you can use AT commands to configure Wifi2UART, please use the following instructions to make it go to AT Command Mode first (also see Figure 2-1 below):

1. send 7 characters: '+' '+' '+' 0x1B 0x1B 0x1B 0x1B, each character is separated to its previous character by at least *uartframetimeout* ms. (for *uartframetimeout* command and its setting, please see **section 5.2.21** for details).

2. the character which is previous to the first '+' character *cannot* be '+'.

When above two conditions are met, Wifi2UART will go to AT Command Mode. Now you can start configuring Wifi2UART. You need to issue the *commit* AT command to save configurations to flash memory (see **section 5.2.23**), so these settings will not be lost after power off.

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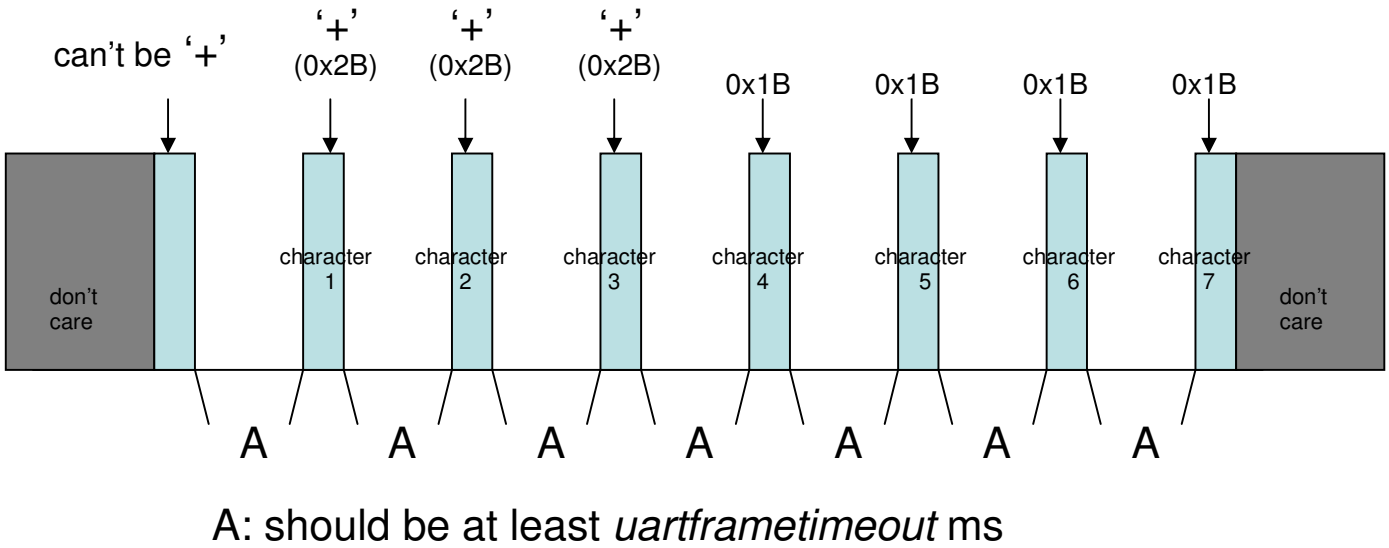

Figure 2-1 Criteria to enter AT Command Mode

After finishing configuring Wifi2UART, you can use the *leave_at* AT command to leave the AT Command Mode (and go to Transparent Transmission Mode, please see **section 5.2.22** for that command) or just reboot Wifi2UART to go to Transparent Transmission Mode.

The AT command configurations can be divided to two categories: Network-related configurations and Service-related configurations. Network-related configurations are for network infrastructure like which interface will be enabled, interface's IP address, DHCP function, WiFi settings, etc.; while Service-related configurations are for sending converted UART data between servers and clients like UART baud rate, the TCP or UDP protocol used, which role Wifi2UART to play (server or client), etc. A complete configuration includes Network-related configuration and Service-related configuration. Please refer to **'section 5 - AT Commands'** for details on AT commands functions and format.

Wifi2UART's factory default settings can be found in Appendix A.

There are many configuration scripts in Appendix which can be used to facilitate your configuration process. For Network-related configuration, please see Appendix C; Service-related configuration, please see Appendix D.

4. Function Description

Wifi2UART can transmit the serial port data to other network interfaces and vice versa. In section 4.1 Network Mode, various network modes, each with different network interfaces enabled, will be described in detail. Wifi2UART can play the role as a server or a client, and communicate with its counterpart using TCP or UDP protocol. In section 4.2 Service Mode with TCP or UDP protocol, various combinations of service modes and protocols will be described.

4.1 Network Mode

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There are four Network Modes for Wifi2UART, each with different network interfaces enabled/disabled. UART data can be sent to those enabled network interfaces and vice versa. Beside the UART to WiFi/Ethernet conversion function, Wifi2UART module itself can also function as a network device.

4.1.1 AP Router Mode

In this mode the Ethernet WAN, Ethernet LAN and WiFi AP interfaces are up and running. Wifi2UART's network function is like an AP Router. Serial (UART) data can be sent to these interfaces, and vice versa. We can enable the DHCP client function on the WAN interface or configure its IP statically. The Ethernet LAN and WiFi AP interfaces are on the same (network) bridge, and we can enable/disable the DHCP server on these interfaces.

4.1.2 Single WAN Mode

In this mode only the Ethernet WAN interface is up and running. Serial (UART) data can be sent to this interface, and vice versa. We can enable DHCP client on the WAN interface or configure its IP statically.

4.1.3 AP Client Mode

In this mode only the AP Client interface is up and running. Serial (UART) data can be sent to this interface, and vice versa. An AP Client can connect to other WiFi AP. The AP Client interface can be treated like a (WiFi) WAN, and we can enable DHCP client on this interface or configure its IP statically.

4.1.4 AP Mode

In this mode only the WiFi AP interface is up and running. Serial (UART) data can be sent to this interface, and vice versa. A WiFi AP allows other WiFi stations to connect to it, and we can enable/disable the DHCP server on this interface.

4.2 Service Mode with TCP or UDP protocol

There are three **Service Mode** for Wifi2UART: Server Mode, Client Mode and *Not-In-Service* Mode. The default Service Mode is *Not-In-Service*, which means the serial (UART) to WiFi/Ethernet conversion function is not in service. In the *Not-In-Service* Mode, the Wifi2UART is an ordinary network device (AP Router, etc.). If you want it to start doing UART to WiFi/Ethernet conversion service, you must change it to Server mode (to be connected by remote clients) or Client mode (to connect to a remote Server) so Wifi2UART knows where to send UART data to (and where to get data from). Please see **'section 5.2.13 service_mode'** on how to change service mode in details.

4.2.1 TCP Server

In this mode the Wifi2UART listens on all of its network interfaces (with a specific TCP port number, which is set by the *service_port* command) for connection requests from remote TCP clients. The Wifi2UART allows up to 10 concurrent TCP connections. The Wifi2UART will send its UART data to all TCP clients and all data from TCP clients to its UART port. If there is no data traffic (from TCP server to client, or from TCP client to server) in a connection for a period of time (set by *service_timeout* command), Wifi2UART will terminate that connection.

4.2.2 TCP Client

In this mode the Wifi2UART will connect to a remote TCP server (with the server's IP and port number set by *service_ip* and *service_port* commands respectively). If auto reconnection function is enabled (by the *tcp_auto* command), Wifi2UART will keep trying to reconnect to the TCP server automatically once it has detected the connection is terminated.

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4.2.3 UDP Server

In this mode the Wifi2UART waits incoming UDP packets on all of its interfaces (with a specific UDP port number, which is set by the *service_port* command). Wifi2UART will record the latest UDP client's IP and port number. Data from UDP clients will be sent to Wifi2UART's UART port, while Wifi2UART's UART data will be sent to its latest UDP client.

4.2.4 UDP Client

In this mode the Wifi2UART will send its UART data to a remote UDP server (with the server's IP and port number set by *service_ip* and *service_port* commands respectively). Data received from Wifi2UART's UDP server will be sent to its UART port.

5. AT Commands

5.1 AT command general description

To configure Wifi2UART, the AT command format is **at+<command_name>=xxx\r** (xxx are the configuration characters, and \r is the Carriage Return character(0x0D)). No space is allowed in the format. Wifi2UART will echo the AT command you send (without the \r) and append it with a space character and then "OK" or "Error" to indicate success or failure of that AT command. Finally a \r will be appended at the end of the response. In Figure 5-1 if we set Net Mode to 5 in the first AT command, Error will be sent back because net_mode can't be set to 5 (only 1~4 are allowed). OK will be sent back after we successfully set Net Mode to 1 in the second AT command.

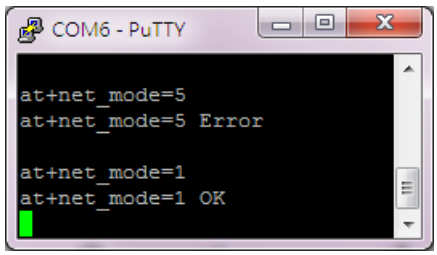

Figure 5-1 AT Command for configuration

To query the current Wifi2UART configurations, the AT command format is **at+<command_name>=?\r** (question mark character and the Carriage Return character). No space is allowed in the format. Wifi2UART will echo the AT command you send (without the \r) and append it with a space and then the response to the query. Finally a \r will be appended at the end of the response. In Figure 5-2, '1' is the response to the Net Mode query.

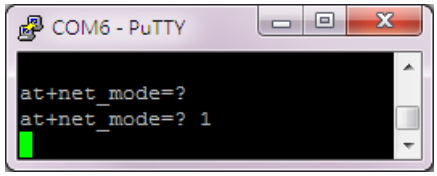

Figure 5-2 AT Command for query

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Some commands can ask Wifi2UART to do special actions. The AT command format is **at+<command_name>=1\r** (character '1' and the Carriage Return character '\r'). Wifi2UART will echo the AT command you send (without \r) and append it with a space character and then "OK" or "Error" at the end to indicate success or failure of that AT command. Finally a \r will be appended at the end of the response. In Figure 5-3, OK is sent back to indicate the AT command is accepted successfully (to ask Wifi2UART to save configurations to flash memory).

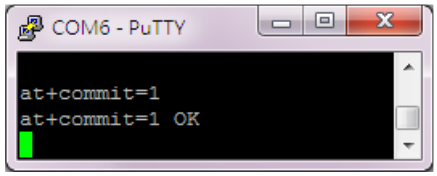

Figure 5-3 AT Command for action

In the table (Table 5.1 AT Command List) below, those commands that can be used to configure settings are indicated by 'S' in the *function* column; those to query current configurations are indicated by 'Q'; those to ask for actions are indicated by 'A'.

The AT command configurations can be divided to two categories: Network-related configurations and Service-related configurations. Those Network-related configurations will take effect after reboot; while Service-related configurations will take effect after reboot or after the *service_restart* AT command is sent. In the table below, those commands that can be used to set Network-related configurations are indicated by 'Net' in the *category* column; those to set Service-related configurations are indicated by 'Srvc'.

command_name	function	category	description
net_mode	S,Q	Net	Network Mode configuration
wifi_ap	S,Q	Net	WiFi AP configuration
wifi_ap_client	S,Q	Net	WiFi AP Client configuration
channel	S,Q	Net	WiFi channel configuration
wan_dhcpc	S,Q	Net	WAN port DHCP client enable/disable configuration
wan_ip	S,Q	Net	WAN port static IP configuration
wan_dns	S,Q	Net	WAN port DNS Server configuration
lan_ip	S,Q	Net	LAN port static IP configuration
dhcpd	S,Q	Net	LAN/WLAN port DHCP Server enable/disable configuration.
dhcpd_ip	S,Q	Net	DHCP Server leasing IP addresses configuration
dhcpd_dns	S,Q	Net	DHCP Server leasing DNS configuration
dhcpd_time	S,Q	Net	DHCP Server lease time configuration in second
service_mode	S,Q	Srvc	Service Mode configuration. There are three modes: Server Mode, Client Mode, or Not-In-Service Mode.
service_ip	S,Q	Srvc	Remote Server's IP configuration (when Wifi2UART is itself in Client Mode)
service_port	S,Q	Srvc	Port number (for TCP and UDP connection) configuration
service_pro	S,Q	Srvc	Protocol configuration. TCP or UDP.
service_timeout	S,Q	Srvc	TCP connection timeout configuration in second (it is used when Wifi2UART is in TCP Server Mode)
tcp_auto	S,Q	Srvc	TCP auto connection configuration (it is used when Wifi2UART is in TCP Client Mode)
uart	S,Q	Srvc	UART baud rate, data bits, parity check, stop bit configuration

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uartframelen	S,Q	Srvc	UART frame length configuration in byte
uartframetimeout	S,Q	Srvc	UART frame timeout configuration in mini second (ms)
leave_at	A		Ask Wifi2UART to leave AT Command Mode (and go to Transparent Transmission Mode)
commit	A		Ask Wifi2UART to save configurations to flash memory.
service_restart	A		Ask Wifi2UART to restart the UART to WiFi/Ethernet conversion service (send/receive UART data to/from remote Servers or Clients).
default	A		Ask Wifi2UART to set to factory default configurations.
reboot	A		Ask Wifi2UART to reboot.
ver	Q		Query the current software version.

Table 5.1 AT Command List

5.2 AT command list

This section describes every AT command's function, format and parameters in detail. To query current settings, the format is always at+<command name>=?\r (see **Appendix B - script to get current configurations**)

5.2.1 net_mode

Function:
Set the Network Mode. Each mode has different network interfaces enabled.
Format:
at+net_mode=<net mode>\r
Parameter:
net mode, please see below table:

value	description
1	**AP Router Mode**. serial to WiFi AP and 2 Ethernet ports (WAN and LAN) conversion. It is the default mode.
2	**Single WAN Mode.** serial to one Ethernet port (WAN) conversion
3	**AP Client Mode**. serial to WiFi AP Client conversion. This AP Client can link to another WiFi AP.
4	**AP Mode**. serial to WiFi AP conversion. Other WiFi stations can link to this AP.

5.2.2 wifi_ap

Function:
WiFi AP configurations.
Format:
at+wifi_ap=<ssid>,<encrypt type>,<password> \r
Parameter:
ssid: wireless network SSID (Maximum length: 20 characters.)
encrypt type: authentication and encryption, please see below table:

value	description
none	Open network
wep_open	wep encryption， open authentication

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wpa_tkip	wpa tkip
wpa_aes	wpa_aes
wpa2_tkip	wpa2 tkip
wpa2_aes	wpa2 aes
wpawpa2_tkip	wpa/wpa2 tkip
wpawpa2_aes	wpa/wpa2 aes

password: password in ASCII format (Maximum length: 13 characters) (note: for wep_open encrypt type, the password should be 5 or 13 characters)

5.2.3 wifi_ap_client

Function:

WiFi AP Client configurations. The configurations shows which remote AP (its SSID, encrypt type and password) this AP Client is intended to link to.

Format:

at+wifi_ap_client=<ssid>,<encrypt type>,<password> \r

Parameter:

ssid: wireless network SSID (Maximum length: 20 characters.)

encrypt type: authentication and encryption, please see below table:

value	**description**
none	Open network
wep_open	wep encryption， open authentication
wpa_tkip	wpa tkip
wpa_aes	wpa_aes
wpa2_tkip	wpa2 tkip
wpa2_aes	wpa2 aes

password: password in ASCII format (Maximum length: 13 characters) (note: for wep_open encrypt type, the password should be 5 or 13 characters)

5.2.4 channel

Function:

WiFi channel selection

Format:

at+channel=<channel>\r

Parameter:

channel: 1 ~ 14

5.2.5 wan_dhcpc

Function:

WAN port DHCP client enable

Format:

at+wan_dhcpc=<enable>\r

Parameter:

enable, please see below table:

value	**description**

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0	DHCP client disabled, WAN port will use static IP configuration
1	DHCP client enabled, WAN port will get IP configuration from a DHCP Server

5.2.6 wan_ip

Function:
Set the static WAN port IP. When WAN port DHCP client is disabled, static IP configuration will be used.
Format:
at+wan_ip=<ip>,<mask>,<gateway>\r
Parameter:
ip: IP address
mask: Subnet mask
gateway: Default gateway IP address

5.2.7 wan_dns

Function:
Set the static WAN port DNS. When WAN port DHCP client is disabled, static DNS configuration will be used.
Format:
at+wan_dns=<dns 1>,<dns 2>\r
Parameter:
dns 1: First DNS IP address
dns 2: Second DNS IP address

5.2.8 lan_ip

Function:
Set the static LAN port IP. The configuration is valid only when Wifi2UART's Network Mode is mode 1 (**AP Router Mode**, default mode) or mode 4 (**WiFi AP Mode**). Please refer to "**4.1 Network Mode".**
Format:
at+lan_ip=<ip>,<mask>\r
Parameter:
ip: IP address
mask: Subnet mask

5.2.9 dhcpd

Function:
Set the DHCP server on LAN port or WLAN (Wireless LAN) port. The configuration and the following dhcpd-related configurations (**5.2.10 dhcpd_ip, 5.2.11 dhcpd_dns, 5.2.12 dhcpd_time**) will be used only when Wifi2UART's Network Mode is mode 1 (**AP Router Mode**, default mode) or mode 4 (**WiFi AP Mode**). Please refer to "**4.1 Network Mode".**
Format:
at+dhcpd=<enable>\r
Parameter:
enable, please see below table:

value	**description**

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0	DHCP server disabled
1	DHCP server enabled

5.2.10 dhcpd_ip

Function:
DHCP Server's leasing IP addresses. Also refer to **section 5.2.9 dhcpd**.
Format:
at+dhcpd_ip=<ip start>,<ip end>,<mask>,<gateway>\r
Parameter:
ip start: start of the IP addresses that Server will lease to DHCP clients
ip end: end of the IP addresses that Server will lease to DHCP clients
mask: subnet mask that Server will provide to DHCP clients
gateway: default gateway that Server will provide to DHCP clients

5.2.11 dhcpd_dns

Function:
DNS information that DHCP Server will provide to its clients. Also refer to **section 5.2.9 dhcpd**.
Format:
at+dhcpd_dns=<dns 1>,<dns 2>\r
Parameter:
dns 1: First DNS IP address
dns 2: Second DNS IP address

5.2.12 dhcpd_time

Function:
DHCP Server's IP lease time in second. Also refer to **section 5.2.9 dhcpd**.
Format:
at+dhcpd_time=<time>\r
Parameter:
time: lease time in second (maximum length is 7 digits)

5.2.13 service_mode

Function:
Set the Service Mode of Wifi2UART
Format:
at+service_mode=<service mode>\r
Parameter:
service mode, please see below table:

value	**description**
none	Wifi2UART is Not-In-Service (or the UART to WiFi/Ethernet conversion is not functioning)
server	Wifi2UART plays the role as a Server in the UART to WiFi/Ethernet conversion.
client	serial to WiFi AP-Client. This AP-Client can link to another WiFi AP.

5.2.14 service_ip

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Function:
When Wifi2UART is configured as a client, the *service_ip* configuration tells Wifi2UART what the remote Server's IP address is.
Format:
at+service_ip=<remote server's ip>\r
Parameter:
remote server's ip: remote Server's IP address

5.2.15 service_port

Function:
When Wifi2UART is configured as a *client*, the *service_port* configuration tells Wifi2UART what the remote Server's TCP or UDP port number is. When Wifi2UART is configured as a *server*, the *service_port* configuration will be used by Wifi2UART as its TCP or UDP port number.
Format:
at+service_port=<port>\r
Parameter:
port: port number (maximum port number is 65535)

5.2.16 service_pro

Function:
Set the protocol used by Wifi2UART to connect to remote Servers or Clients.
Format:
at+service_pro=<protocol>\r
Parameter:
protocol, please see below table:

value	description
tcp	TCP protocol
udp	UDP protocol

5.2.17 service_timeout

Function:
When Wifi2UART is configured as a TCP Server, it will terminate the TCP connection to a client if there is no traffic (from Server to client and vice versa) between them for more than *service_timeout* seconds. If this setting is 0, it means never timeout.
Format:
at+service_timeout=<service timeout>\r
Parameter:
service timeout: timeout in seconds (maximum length is 6 digits). 0 for never timeout.

5.2.18 tcp_auto

Function:
When Wifi2UART is configured as a TCP Client and *tcp_auto* is set to 1, it will try to auto reconnect to the remote TCP server when disconnection is detected by Wifi2UART.
Format:

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at+tcp_auto=<enable>\r

Parameter:

enable, please see below table:

value	description
0	TCP auto reconnection is disabled
1	TCP auto reconnection is enabled

5.2.19 uart

Function:

Set the serial port configurations.

Format:

at+uart=<baud>,<data>,<parity>,<stop>\r

Parameter:

baud: baud rate (could be 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, or 230400 bps)

data: data bits (could be 5, 6, 7, 8 bits)

parity: parity check (could be *n* for no parity check, *1* for odd parity check or *2* for even parity check)

stop: stop bits (could be 1 or 2 bits)

5.2.20 uartframelen

Function:

Set the serial port frame length in byte. Wifi2UART will send serial (UART) data to WiFi/Ethernet interfaces after it receives at least *uartframelen* byte of data from the serial port. Otherwise Wifi2UART will wait until *uartframetimeout* timeout (see section **5.2.21 uartframetimeout**) to send data to WiFi/Ethernet interfaces.

Format:

at+uartframelen=<frame length>\r

Parameter:

frame length: frame length in bytes. (maximum length is 999 bytes)

5.2.21 uartframetimeout

Function:

Set the serial port frame timeout in ms. Wifi2UART will send UART data to WiFi/Ethernet after it receives at least *uartframelen* byte of data from the serial port (see section **5.2.20 uartframelen**). Otherwise Wifi2UART will wait until *uartframetimeout* timeout expires to send UART data to WiFi/Ethernet.

The minimum value is 50 ms and every increasing step is 10 ms.

Format:

at+ uartframetimeout =<frame timeout>\r

Parameter:

frame timeout: timeout in ms. (minimum value is 50 ms, every increasing step is 10 ms , maximum value is 999990 ms)

5.2.22 leave_at

Function:

Ask Wifi2UART to leave AT Command Mode (and go to Transparent Transmission Mode) (after you

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have finished configuring Wifi2UART).
Format:
at+leave_at=1\r
Parameter:
N.A.

5.2.23 commit

Function:
Ask Wifi2UART to save configurations to flash memory. You must issue this AT command to save new configurations to flash memory, otherwise new configurations will be lost after power off.
Format:
at+commit=1\r
Parameter:
N.A.

5.2.24 service_restart

Function:
After you change Service-related configurations (refer to **section 5.1 AT command general description**), you can issue this command to ask Wifi2UART to restart server/client to client/server connection and doing UART to WiFi/Ethernet conversion based on these new configurations.
Format:
at+service_restart=1\r
Parameter:
N.A.

5.2.25 default

Function:
Ask Wifi2UART to set to factory default configurations. Wifi2UART's factory default settings can be found in Appendix A.
Format:
at+default=1\r
Parameter:
N.A.

5.2.26 reboot

Function:
Ask Wifi2UART to reboot.
Format:
at+reboot=1\r
Parameter:
N.A.

5.2.27 ver

Function:

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Query the current software version..

Format:

at+ver=?\r

Parameter:

N.A.

Appendix A - factory default configurations

command_name	function	default configuration	description
net_mode	S,Q	1	AP Router Mode
wifi_ap	S,Q	RT5350_AP,none	For WiFi AP: SSID is RT5350_AP Encrypt type is none (Open network)
wifi_ap_client	S,Q	No initial settings.	For WiFi AP Client: No default configuration. Users need to configure it by themselves.
channel	S,Q	1	WiFi channel number: 1
wan_dhcpc	S,Q	1	WAN port DHCP client mode is enabled.
wan_ip	S,Q	192.168.1.1,255.255.255.0, 192.168.1.254	WAN port static IP: IP is 192.168.1.1 Mask is 255.255.255.0 Gateway is 192.168.1.254
wan_dns	S,Q	168.95.1.1,8.8.8.8	WAN port static DNS Server: First DNS is 168.95.1.1 Second DNS is 8.8.8.8
lan_ip	S,Q	10.10.10.254,255.255.255.0	LAN port static IP: IP is 10.10.10.254 Mask is 255.255.255.0
dhcpd	S,Q	1	LAN/WLAN DHCP Server is enabled.
dhcpd_ip	S,Q	10.10.10.100,10.10.10.200, 255.255.255.0,10.10.10.254	DHCP Server leasing IP addresses: Start IP is 10.10.10.100 End IP is 10.10.10.200 Mask is 255.255.255.0 Gateway is 10.10.10.254
dhcpd_dns	S,Q	168.95.1.1,8.8.8.8	DHCP Server leasing DNS: First DNS is 168.95.1.1 Second DNS is 8.8.8.8
dhcpd_time	S,Q	86400	DHCP Server lease time: 86400 seconds.
service_mode	S,Q	none	Not-In-Service Mode
service_ip	S,Q	192.168.1.254	Remote Server's IP: 192.168.1.254
service_port	S,Q	8080	TCP or UDP port number is 8080.
service_pro	S,Q	tcp	Protocol configuration: TCP
service_timeout	S,Q	0	0 means never timeout
tcp_auto	S,Q	1	TCP client auto reconnection is enabled
uart	S,Q	115200,8,n,1	UART baud rate, data bits, parity check, stop

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			bit: 115200, 8, no parity check, 1
uartframelen	S,Q	64	UART frame length is 64 bytes
uartframetimeout	S,Q	50	UART frame timeout is 50 ms
leave_at	A	N.A.	
commit	A	N.A.	
service_restart	A	N.A.	
default	A	N.A.	
reboot	A	N.A.	
ver	Q	01.00.01	current software version: 01.00.01

You can use the script in **Appendix B** to get these factory default configurations:
at+net_mode=? 1
at+wifi_ap=? RT5350_AP,none
at+wifi_ap_client=? No initial settings. Or previous settings are illegal
at+channel=? 1
at+wan_dhcpc=? 1
at+wan_ip=? 192.168.1.1,255.255.255.0,192.168.1.254
at+wan_dns=? 168.95.1.1,8.8.8.8
at+lan_ip=? 10.10.10.254,255.255.255.0
at+dhcpd=? 1
at+dhcpd_ip=? 10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254
at+dhcpd_dns=? 168.95.1.1,8.8.8.8
at+dhcpd_time=? 86400
at+service_mode=? none
at+service_ip=? 192.168.1.254
at+service_port=? 8080
at+service_pro=? tcp
at+service_timeout=? 0
at+tcp_auto=? 1
at+uart=? 115200,8,n,1
at+uartframelen=? 64
at+uartframetimeout=? 50
at+ver=? 01.00.01
(please note Wifi2UART will append a \r at the end of every response)

Appendix B - script to get current configurations

To each query command, Wifi2UART will echo the AT command you send (without the \r) and append it with a space and then the response to the query. Finally a \r will be appended at the end of response.

In the below AT commands, please make sure every AT command must end with \r.

at+net_mode=?
at+wifi_ap=?
at+wifi_ap_client=?
at+channel=?
at+wan_dhcpc=?

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at+wan_ip=?
at+wan_dns=?
at+lan_ip=?
at+dhcpd=?
at+dhcpd_ip=?
at+dhcpd_dns=?
at+dhcpd_time=?
at+service_mode=?
at+service_ip=?
at+service_port=?
at+service_pro=?
at+service_timeout=?
at+tcp_auto=?
at+uart=?
at+uartframelen=?
at+uartframetimeout=?
at+ver=?
(please make sure every AT command must end with '\r')

Appendix C - scripts to configure Network-related settings

A complete configuration includes Network-related configuration and Service-related configuration (see Appendix D). Please combine these two configurations according to your requirement.

Before you start configuration by using AT commands, please follow instructions in **section 3 Quick Start** to go to AT Command mode first.

C.1 AP Router Mode configuration script
-- with WAN port DHCP client enabled and LAN port DHCP server enabled

Network Mode	WAN (Ethernet)	AP	AP Client	LAN (and WLAN)
AP Router	DHCP client enabled	SSID: RT5350_AP, encrypt type: none, Channel 1 is used.	N.A.	DHCP server enabled

at+net_mode=1
at+wifi_ap=RT5350_AP,none
at+channel=1
at+wan_dhcpc=1
at+lan_ip=10.10.10.254,255.255.255.0
at+dhcpd=1
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254
at+dhcpd_dns=168.95.1.1,8.8.8.8
at+dhcpd_time=86400
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=1 OK

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at+wifi_ap=RT5350_AP,none OK
at+channel=1 OK
at+wan_dhcpc=1 OK
at+lan_ip=10.10.10.254,255.255.255.0 OK
at+dhcpd=1 OK
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254 OK
at+dhcpd_dns=168.95.1.1,8.8.8.8 OK
at+dhcpd_time=86400 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.2 AP Router Mode configuration script
-- with WAN port DHCP client disabled and LAN port DHCP server enabled

Network Mode	WAN (Ethernet)	AP	AP Client	LAN (and WLAN)
AP Router	DHCP client disabled, use static IP settings	SSID: RT5350_AP, encrypt type: none, Channel 1 is used.	N.A.	DHCP server enabled

at+net_mode=1
at+wifi_ap=RT5350_AP,none
at+channel=1
at+wan_dhcpc=0
at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254
at+wan_dns=168.95.1.1,8.8.8.8
at+lan_ip=10.10.10.254,255.255.255.0
at+dhcpd=1
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254
at+dhcpd_dns=168.95.1.1,8.8.8.8
at+dhcpd_time=86400
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=1 OK
at+wifi_ap=RT5350_AP,none OK
at+channel=1 OK
at+wan_dhcpc=0 OK
at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254 OK
at+wan_dns=168.95.1.1,8.8.8.8 OK
at+lan_ip=10.10.10.254,255.255.255.0 OK
at+dhcpd=1 OK
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254 OK
at+dhcpd_dns=168.95.1.1,8.8.8.8 OK

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at+dhcpd_time=86400 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.3 Single WAN Mode configuration script -- with WAN port DHCP client enabled

Network Mode	WAN (Ethernet)	AP	AP Client	LAN
Single WAN	DHCP client enabled	N.A.	N.A.	N.A.

at+net_mode=2
at+wan_dhcpc=1
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=2 OK
at+wan_dhcpc=1 OK

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.4 Single WAN Mode configuration script -- with WAN port DHCP client disabled

Network Mode	WAN (Ethernet)	AP	AP Client	LAN
Single WAN	DHCP client disabled, use static IP settings	N.A.	N.A.	N.A.

at+net_mode=2
at+wan_dhcpc=0
at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254
at+wan_dns=168.95.1.1,8.8.8.8
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=2 OK
at+wan_dhcpc=0 OK

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at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254 OK
at+wan_dns=168.95.1.1,8.8.8.8 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.5 AP Client Mode configuration script -- with WAN port DHCP client enabled

Network Mode	WAN (AP Client plays the role as WAN)	AP	AP Client	LAN
AP Client	DHCP client enabled	N.A.	Ask AP Client to link to an AP (whose SSID is remote_AP), with encrypt type: wep_open, and password 12345. Channel 1 is used.	N.A.

at+net_mode=3
at+wan_dhcpc=1
at+wifi_ap_client=remote_AP,wep_open,12345
at+channel=1
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=3 OK
at+wan_dhcpc=1 OK
at+wifi_ap_client=remote_AP,wep_open,12345 OK
at+channel=1 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.6 AP Client Mode configuration script -- with WAN port DHCP client disabled

Network Mode	WAN (AP Client will play the role as WAN)	AP	AP Client	LAN
AP Client	DHCP client disabled,	N.A.	Ask AP Client to link to an AP (whose	N.A.

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	use static IP settings		SSID is remote_AP), with encrypt type: wep_open, and password 12345. Channel 1 is used.	

at+net_mode=3
at+wan_dhcpc=0
at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254
at+wan_dns=168.95.1.1,8.8.8.8
at+wifi_ap_client=remote_AP,wep_open,12345
at+channel=1
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:
at+net_mode=3 OK
at+wan_dhcpc=0 OK
at+wan_ip=192.168.1.1,255.255.255.0,192.168.1.254 OK
at+wan_dns=168.95.1.1,8.8.8.8 OK
at+wifi_ap_client=remote_AP,wep_open,12345 OK
at+channel=1 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

C.7 AP Mode configuration script -- with LAN port DHCP client enabled

Network Mode	WAN	AP	AP Client	LAN (WLAN)
AP	N.A.	SSID: RT5350_AP, encrypt type: wep_open, password: 1234567890123. Channel 1 is used.	N.A.	DHCP server enabled

at+net_mode=4
at+wifi_ap=RT5350_AP,wep_open,1234567890123
at+channel=1
at+lan_ip=10.10.10.254,255.255.255.0
at+dhcpd=1
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254
at+dhcpd_dns=168.95.1.1,8.8.8.8
at+dhcpd_time=86400
(please make sure every AT command must end with '\r')

The Wifi2UART's response on serial port will be:

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at+net_mode=4 OK
at+wifi_ap=RT5350_AP,wep_open,1234567890123 OK
at+channel=1 OK
at+lan_ip=10.10.10.254,255.255.255.0 OK
at+dhcpd=1 OK
at+dhcpd_ip=10.10.10.100,10.10.10.200,255.255.255.0,10.10.10.254 OK
at+dhcpd_dns=168.95.1.1,8.8.8.8 OK
at+dhcpd_time=86400 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

Then reboot Wifi2UART for new Network-related configurations to take effect. This can be done by:
at+reboot=1
(please make sure every AT command must end with '\r')

Appendix D - scripts to configure Service-related settings

A complete configuration includes Network-related configuration (see Appendix C) and Service-related configuration. Please combine these two configurations according to your requirement.

Before you start configuration by using AT commands, please follow instructions in **section 3 Quick Start** to go to AT Command mode first.

D.1 TCP Server configuration script

Service Mode	protocol	Service IP	Service port	TCP client auto reconnection	TCP service timeout	UART
server	TCP	N.A. (listen on all interfaces' IP)	8080 (TCP port number)	N.A.	0 (never timeout)	115200,8,n,1

at+service_mode=server
at+service_port=8080
at+service_pro=tcp
at+service_timeout=0
at+uart=115200,8,n,1
at+uartframelen=64
at+uartframetimeout=50

The Wifi2UART's response on serial port will be:
at+service_mode=server OK
at+service_port=8080 OK
at+service_pro=tcp OK
at+service_timeout=0 OK
at+uart=115200,8,n,1 OK
at+uartframelen=64 OK

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at+uartframetimeout=50 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

For Service-related configurations to take effect, it can be done by (1) asking Wifi2UART to restart service and then leave AT Command Mode (to go to Transparent Transmission Mode):
at+servive_restart=1
at+leave_at=1

or (2) rebooting Wifi2UART:
at+reboot=1
(please make sure every AT command must end with '\r')

D.2 TCP Client configuration script

Service Mode	protocol	Service IP	Service port	TCP client auto reconnection	TCP service timeout	UART
client	TCP	192.168.1.254 (remote server's IP)	8080 (TCP port number)	Yes	N.A.	115200,8,n,1

at+service_mode=client
at+service_ip=192.168.1.254
at+service_port=8080
at+service_pro=tcp
at+service_timeout=0
at+tcp_auto=1
at+uart=115200,8,n,1
at+uartframelen=64
at+uartframetimeout=50

The Wifi2UART's response on serial port will be:
at+service_mode=client OK
at+service_ip=192.168.1.254 OK
at+service_port=8080 OK
at+service_pro=tcp OK
at+service_timeout=0 OK
at+tcp_auto=1 OK
at+uart=115200,8,n,1 OK
at+uartframelen=64 OK
at+uartframetimeout=50 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

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For Service-related configurations to take effect, it can be done by (1) asking Wifi2UART to restart service and then leave AT Command Mode (to go to Transparent Transmission Mode):
at+servive_restart=1
at+leave_at=1

or (2) rebooting Wifi2UART:
at+reboot=1
(please make sure every AT command must end with '\r')

D.3 UDP Server configuration script

Service Mode	protocol	Service IP	Service port	TCP client auto reconnection	TCP service timeout	UART
server	UDP	N.A. (use all interfaces' IP)	8080 (UDP port number)	N.A.	N.A.	115200,8,n,1

at+service_mode=server
at+service_port=8080
at+service_pro=udp
at+uart=115200,8,n,1
at+uartframelen=64
at+uartframetimeout=50

The Wifi2UART's response on serial port will be:
at+service_mode=server OK
at+service_port=8080 OK
at+service_pro=udp OK
at+uart=115200,8,n,1 OK
at+uartframelen=64 OK
at+uartframetimeout=50 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

For Service-related configurations to take effect, it can be done by (1) asking Wifi2UART to restart service and then leave AT Command Mode (to go to Transparent Transmission Mode):
at+servive_restart=1
at+leave_at=1

or (2) rebooting Wifi2UART:
at+reboot=1
(please make sure every AT command must end with '\r')

D.4 UDP Client configuration script

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Service Mode	protocol	Service IP	Service port	TCP client auto reconnection	TCP service timeout	UART
client	UDP	192.168.1.254 (remote server's IP)	8080 (UDP port number)	N.A.	N.A.	115200,8,n,1

at+service_mode=client
at+service_ip=192.168.1.254
at+service_port=8080
at+service_pro=udp
at+uart=115200,8,n,1
at+uartframelen=64
at+uartframetimeout=50

The Wifi2UART's response on serial port will be:
at+service_mode=client OK
at+service_ip=192.168.1.254 OK
at+service_port=8080 OK
at+service_pro=udp OK
at+uart=115200,8,n,1 OK
at+uartframelen=64 OK
at+uartframetimeout=50 OK
(please note Wifi2UART will append a \r at the end of every response)

After you have configured Wifi2UART successfully, please save configurations to flash memory by:
at+commit=1
(please make sure every AT command must end with '\r')

For Service-related configurations to take effect, it can be done by (1) asking Wifi2UART to restart service and then leave AT Command Mode (to go to Transparent Transmission Mode):
at+servive_restart=1
at+leave_at=1

or (2) rebooting Wifi2UART:
at+reboot=1
(please make sure every AT command must end with '\r')

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